

HANDBOOK OF PHONOLOGICAL DATA
FROM A SAMPLE OF THE WORLD'S LANGUAGES

A Report of the Stanford Phonology Archive

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125 Zulu	125 Zulu	125 Zulu
125 01 p-aspirated ⁰²	27 f [p/f-ejective] ⁶¹	50 m-syllabic ¹⁸
125 02 p-ejective ⁰²	28 v [b/v] ⁶¹	51 n-syllabic ¹⁸ [n-palatal-syllabic] ⁶⁴ [eng-syllabic] ⁶⁴ [i-nasalized] ⁶⁴
125 03 p ⁰² [b] ⁶⁰	29 s ⁶¹	
125 04 b-implosive ⁰¹	30 z [d/z] ⁶¹	
125 05 t/s-click ⁰⁴	31 s-hacek ⁶¹ [t/s-hacek-aspirated] ⁰⁷ (free)	
125 08 t-aspirated ⁰²	35 m [m-labiodental] ⁶²	53 epsilon [e] ⁶⁷
125 09 t-ejective ⁰²	36 n [eng] ⁶⁵ */k/	54 alpha
125 10 t ⁰² [d] ⁶⁰	37 n-palatoalveolar	57 u
125 11 c-palatoalveolar-click ⁰⁴	42 l ¹⁰ [l-palatalized-syllabic] ⁶⁶ (free)	59 o-open [o] ⁶⁷
125 12 t/l-fricative-click ⁰⁴	43 l-fricative-voice [d/l] ⁶¹	61 yod-
125 17 k-lax ⁰³	44 l-fricative [t/l-fricative-ejective] ⁶¹	62 w ¹⁹
125 18 k-aspirated ⁰²	46 h [x] ⁰⁸ (free)	80 high [low-rising] ⁶⁸
125 19 k-ejective ⁰²	47 h-voice	81 low [mid] ⁶⁹
125 20 k ⁰² *[eng] [g] ⁶⁰		82 high-falling [low-rising-falling] ⁶⁸
125 21 t/s-ejective ⁶¹		
125 24 t/s-hacek-ejective ⁶¹		
125 25 d/z-hacek		
125 26 k/x-lateral-ejective ^{02 05} [k/x-ejective] (free)		
125 \$a Zulu \$A Nguni \$d Bantu \$e Rhodesia, Botswana, South Africa Swaziland, Lesotho \$f 3 million \$g Merritt Ruhlen \$g Jim Lorentz (review) \$g John Crothers (editor)		
125 \$a Doke, Clement M. \$b 1969 \$B orig. pub. 1926 in: Bantu Studies, vol.II, Special Number \$c The phonetics of the Zulu language \$g (reprint) Nendeln/Liechtenstein: Kraus Reprint \$q informants: 2 main informants \$r about 2 years		
125 \$a Doke, Clement M. \$b 1961 \$c Textbook of Zulu Grammar \$g Cape Town: Longmans		
125 \$a CONSONANT HARMONY \$A "Zulu, like most other Bantu languages, shows a strong tendency to consonantal harmony.... It is seldom that one finds in any one word more than one positional type of click sound.... [Other harmonies]: ejective explosive with ejective affricate, aspirated explosive with fricative, voiced explosive with voiced affricate." (p.173)		
125 \$a LONG VOWELS \$A Vowels are long with main stress and half-long with secondary stress. Also the contracted forms of nouns with certain noun prefixes have long vowels, which are reasonably analyzed as clusters. There appear to be no cases of lexical or grammatical vowel length. [JHC] (p.179ff)		
125 \$a MARGINAL SPEECH SOUNDS \$A [r-trill] occurs in "onomatopoeic words indicative of the flight of birds" and also in loans. (p.95) [h-voice-nasalized] and [glottal stop] occur in a few exclamations and imitative words. (p.53) [beta] is found in a few onomatopoeic radicals. (p.87) [z-hacek] is used in singing. (p.90)		
125 \$a MORPHOPHONEMICS \$A Only two series of stops occur after nasals: ejectives and voiced stops. Aspirated stops become ejectives after nasals, and most ejectives are of this type, ejectives		

being uncommon in isolation. /p/ and /b-implosive/ fall together as [b] after nasals. After nasals aspirated clicks (i.e. with /k-aspirated/) become nasal clicks (with [eng]) and the others become voiced (with [g]).

125 \$a **NASALIZED VOVELS (NON-DISTINCTIVE)** \$A "Vowels may become distinctly nasalized when in close proximity to certain nasal consonants. This is especially noticeable with the glottal nasal.... Kymograph tracings also clearly reveal the nasalization of the vowels, when used before syllabic nasals." (p.39)

125 \$a **PHARYNGEALIZATION** \$A "Pharyngeal friction occurs on certain vowels /schwa, o-open/ in onomatopoeic radicals, on nasals /m, n, eng/ and /alpha/ in imitative sounds. These sounds are made by a contraction of the pharynx causing vibration of the epiglottis." (p.33)

125 \$a **STRESS** \$A "The main stress is very strong.... Secondary stress is much slighter.... Normal main stress in Zulu is in the penultimate syllable of the word or word-group, and, ...is usually accompanied by length of the vowel or syllabic nasal.... In the case of certain onomatopoeic radicals, penultimate main stress is found on short syllables..., Secondary stress [manifested as half-length]... is found, as a general rule, on every second syllable back from the penultimate of words with an even number of syllables. If the words have an odd number of syllables, more than three, the secondary stress is found on the root syllable and every second syllable thereafter or thereafter provided that at least one (maybe two) unstressed syllable is left before the main stress." (p.182-184) Underlying main word stress is reduced to secondary stress when it occurs before another main stress in the same phrase ("word group"). (p.190)

125 \$a **SYLLABLE** \$A (C)(C)(C)V \$A Clusters include consonant plus /w/, nasal plus consonant, and velar stop or nasal plus click (the last treated as units by Doke). (p.179) Doke finds a few rare cases of diphthongs. (p.33-7)

125 \$a **TONE** \$A domain of tone: syllable \$A Doke does not give a phonemic analysis of tone in either source. He writes nine phonetic levels and combines these into a number of rising and falling tones. In a summary (esp. p.231ff) he isolates the more general patterns, without however arriving at tonemes or giving general rules for variants. The different patterns can probably be reduced to three tonemes, /high/, /low/, and /high-falling/, the last occurring only on stressed syllables, and only before /low/. (There is no immediately obvious way to eliminate /high-falling/ as a toneme.) Doke's highest tone level, level 1, occurs almost exclusively as a feature of emphasis, and can be ignored in the tonemic analysis. 2 and 3 seem to be nearly interchangeable, and are referred to here as [high]; 4 is called [mid], and 5, 6, 7, and 8 are called [low]; 9 occurs only at the end of words and is also called [low] here. The allophonic rules given in the Archive are based on these approximations. One type of distinction not accounted for here is that between the sequences 3.2.9 and 3.4.9 (or 2.3.9). If this is a genuine distinction the first would have to be analyzed as /low.high.low/ and the second as /high.high.low/, and the rule raising /low/ between /high/ tones would have to be modified to raise /low/ to [higher-mid] between word boundary and a following /high/. [JHC] (See p.197ff.)

125 \$a **VOICELESS NASALS** \$A "In the imitation of certain sounds, Zulu occasionally employs devocalized nasals." (p.79)

125 01 \$A "The glottis is not entirely closed during the articulation [of [b-implosive]]." (p.60)

125 02 \$A The voice onset of the voiceless unaspirated stops is simultaneous with release of the stop. The aspirated stops are more strongly aspirated than, for example, English aspirated stops. The ejective release of ejective stops is "very slight...unless the word is emphasized.... In ordinary speech...to the untrained ear the ejection of the explosives is scarcely perceptible." (p.47-48)

125 03 \$A /k-lax/ may be a variant of /k/. It seems to occur only in unstressed positions. Doke says it differs from /k/ "only in breath force." (p.46, 55) This lax articulation is also suggested by the description of this sound in Zier vogel, D.; Louw, J.A. and P.C. Taljaard; 1967; A handbook of the Zulu language; Pretoria: J.L. Van Schaik; p.12: "a voiced velar with only partial occlusion." In his discussion of Ndebele and Zulu, Ladefoged (1971, Preliminaries to linguistic phonetics, Chicago: U. Chicago Press, p.14) finds no difference between /k/ and /k-lax/ (both of which he says are voiced) except that /k/ "is a depressor of the tone on the following vowel."

125 04 \$A Clicks require a velar closure for their formation. After the click proper (the forward closure) is released, it is then necessary for the velar closure to be released in the transition to the following vowel, and this transition can be accomplished in several distinctive ways. Thus the three types of click articulation occur in combination with a variety of velars: the plain, voiced, and aspirated stops, the plain nasal, and nasal plus voiced stop cluster. While Doke prefers to treat all these combinations as units (except for the last), due apparently to the fact that the velar articulation is sustained throughout the click articulation, we have analyzed them here as clusters of click plus velar due to the productivity of combination. [JHC] (p.123ff) "The unvoiced dental click may be at times slightly drawn out, there being considerable friction with the teeth.... [For palatoalveolar clicks] the forward point of articulation varies from palato-alveolar to alveolar.... The

lateral click,...may be, and often is, drawn out to considerable length with friction against the side teeth.... Zulu lateral clicks are released unilaterally...either left or right side may be used...." (p.127-130)

125 05 \$A In the pronunciation of /k/x-lateral-ejective/ "the back of the tongue...is raised to touch the velum in the middle...while a narrow space is left at one side for the air to rush out unilaterally." (p.101)

125 07 \$A [t/s-hacek-aspirated] "is only found as the emphasized form of the fricative [s-hacek]." (p.112)

125 08 \$A [χ] seems to be a dialectal or stylistic variant of /h/. Doke's example of a minimal pair, the two words meaning "draw" and "lead," hardly supports his claim of phonemic contrast between the two sounds. His other examples show the two in free variation or show [χ] as a more "emphatic" form. (p.91)

125 10 \$A "In Zulu 'l' is always of the clear forward variety.... Instances of 'l' changing to 'd' after 'n']...are rare."

125 18 \$A /m-syllabic/, representing the Bantu prefix "mu," occurs stressed or unstressed, with its own tone, before most consonants and word boundary. /n-syllabic/ is found as the final syllable of various prefixes, occurs only unstressed with tone determined by surrounding syllables, occurs only before ejective and voiced stops, and always assimilates to the position of a following stop. There appears to be a potential for contrast, not only between /m-syllabic/ and /n-syllabic/, but also between syllabic and non-syllabic nasals before stops. When basic /n-syllabic/ occurs before fricatives it becomes non-syllabic; before nasals and /l/ it is lost; before glides and glottals it becomes [i-nasalized]. In combination with aspirated clicks (those with /k-aspirated/) it becomes a nasal click (with [eng]). (p.64ff)

125 19 \$A "/w/ never combines with any of the bi-labials, and this is one of the main causes of pre-palatalization i.e. the morphophonemic alternation of bilabials to palatoalveolars, see p. 139ff--JL.I" (p.117) Under other conditions (for example, the formation of the possessive) /w/ after a bilabial is simply deleted. Also /C.w/ may not occur before a rounded vowel. Here too, /w/ is deleted. (p.117-118)

125 60 \$A /p, t, k/ are voiced after nasals (but not after /m-syllabic/ apparently). (For some reason Doke writes the voiced allophones as prenasalized voiced stops.) (1961, p.10)

125 61 \$A All fricatives except /χ/ are realized as homorganic affricates after nasals (except /m-syllabic/). Voiceless fricatives become ejectives. For /s/ and /s-hacek/ the rule states a morphophonemic alternation with /t/s-ejective/ and /t/s-hacek-ejective/ respectively.

125 62 \$A /m/ (but not /m-syllabic/) is labiodental before a labiodental fricative (the latter being affricated).

125 64 \$A /n-syllabic/ becomes homorganic with a following stop. It becomes [i-nasalized] after /i/ and before /yod, w, h, h-voice/. (The latter environment is found only in plural markers of class 6.) (p.64ff, p.35f)

125 65 \$A [eng], can be analyzed as an allophone of /n/ (or /k/) in all occurrences. It occurs before velar stops and with clicks (= nasal clicks) where it can be treated as /n/ plus stop and /n/ plus click. Also /k/, which is voiced after [eng] may become nasalized, i.e. [eng]. (p.75ff, 78f)

125 66 \$A /l.i/ and /l.u/ may be reduced to [l-palatalized-syllabic] and [l-labiovelarized-syllabic]. (p.102)

125 67 \$A /epsilon, o-open/ become [e, o] (1) when the nearest following vowel is /i/ or /u/, (2) when unstressed (neither primary nor secondary stress) and immediately followed by /m/ or /n/, (3) when long and unstressed (this being always the result of prefixation, apparently). (p.26ff)

125 68 \$A /high/ and /high-falling/ become [low-rising] and [low-rising-falling] in syllables beginning with voiced obstruents. (p.205ff) (Further allophonic details ignored here.)

125 69 \$A /low/ becomes [mid] when between two /high/ tones and not preceded by a voiced obstruent. (p.208ff) (Further allophonic details ignored here.)